

# **Weapons assessment efficiencies through use of nondestructive laser gas sampling**

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**New weapons assessment technology engineered: nondestructive laser welding process far less expensive, no underground testing**

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Valveless laser processing

One of the most difficult and costly processes in nuclear weapons assessment is now easier and less expensive because of a new technology developed by scientists and engineers at LANL.

The new automated testing technology is called Nondestructive Laser Gas Sampling (NDLGS), and is expected to save several million dollars per year. The development is a collaboration of Los Alamos, the Y-12 plant in Tennessee, and the Pantex Plant in Texas, and is currently being deployed at Y-12.

## **Assessing High Value System**

“As part of our nuclear deterrent, we have designed, developed, and fielded high-value, very complex sealed systems that have to last a very long time,” said Steve Renfro, NDLGS program manager. “There is a very clear need for the ability to go in and remotely sample those systems without having to tear them down or destroy them.”

The NDLGS system's primary capability is assessing the internal gas constituents of weapons components. This is essential for scientists and engineers as they study the aging processes and overall health of the nuclear weapons stockpile. The technology was first used on a W76 Retrofit Evaluation System Test unit on May 3, 2012.

## **Significant Cost Savings**

The cost savings are realized because the technology is nondestructive, allowing weapon components to be placed back into the stockpile after testing, avoiding the cost of new manufacture. In addition, the process greatly improves safety and minimizes worker's exposure to hazardous materials.

“We're continually innovating and working to improve the way we do business, and NDLGS is a big step for us,” said National Nuclear Security Administration Deputy Administrator for Defense Programs Don Cook. “The new process helps NNSA deliver President Obama's nuclear security agenda and continues to ensure the safety, security, and effectiveness of the nuclear deterrent without underground testing.”

## **Combined Technologies**

The system combines precision laser processing technology with a high-performance vacuum system that detects low-levels of gas constituents within sealed volumes. The result is an accurate gas sample of the weapon component interior. The NNSA also plans to use this capability to improve trending data for aging affects by gas sampling weapon components multiple times.

The laser processing technologies developed for NDLGS have many applications in the areas of industrial manufacturing, waste remediation, and scientific analysis. This technology, known as valveless laser processing, is a joint LANL/Y-12 entry for a 2012 R&D 100 award.

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